BRACKET ASSEMBLY FOR A DYNAMOELECTRIC MACHINE

BACKGROUND OF THE INVENTION

This invention relates generally to dynamoelectric machines, and more particularly, to support brackets for bearing assemblies in dynamoelectric machines.

Dynamoelectric machines typically include a stator and a rotor positioned within a bore of the stator. In certain dynamoelectric machines, energization of the stator causes the rotor to rotate with respect to the stator. In other dynamoelectric machines, rotation of the rotor with respect to the stator causes an electric current to be generated. The rotor typically includes an extended rotor shaft rotatably mounted upon bearings. These bearings are generally mounted to a machine housing via bearing support brackets.

Bearing support brackets are subject to static and dynamic stresses from supporting the dynamoelectric machine rotor and associated components coupled to the rotor shaft. In use, a varying degree of vibration is experienced by the bearing support brackets due to varying loads and operating conditions. Typically, bearing support brackets are specifically designed for use with a particular dynamoelectric machine to avoid possible excitation of the brackets at their natural frequencies. These brackets, however, become excessively heavy and costly as the dynamoelectric machine size increases.

Accordingly, it would be desirable to provide a low cost bracket having a stiffness sufficient to avoid excitation thereof at selected undesirable frequencies.

BRIEF SUMMARY OF THE INVENTION

In an exemplary embodiment, a dynamoelectric machine includes a bearing support bracket assembly including a base plate and a bracket support assembly connected thereto. The bracket support assembly includes a curved support member contacting a first end plate and a second end plate. At least one support plate extends from the support member and contacts the first end plate and the second end plate. In addition, the bracket support assembly includes a side plate opposite the support member that extends between the base plate and the support plate. The

support plate is separated from the base plate by a distance and contacts the support member, the end plates and the side plate.

Attachment of the bracket support assembly to the base plate reinforces the bearing support bracket assembly and provides a configuration effectively achieving the desired natural frequency which is unlikely to be excited in use.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of a known dynamoelectric machine;

Figure 2 is a perspective view of a bearing support bracket attached to a dynamoelectric machine; and

Figure 3 is a perspective view of the bearing support bracket shown in Figure 2.

DETAILED DESCRIPTION OF THE INVENTION

Figure 1 illustrates a known dynamoelectric machine 10, the construction and operation of which is well known, and with which the present invention may be practiced. It is contemplated, however, that the present invention is equally applicable to other types of dynamoelectric machines, and the description of machine 10 is therefore provided for illustrative purposes only rather than by way of limitation. Machine 10 includes a frame 12, a first bearing support bracket assembly 14 coupled to frame 12 at a first end 16, and a second bearing support bracket assembly (not shown) coupled to frame 12 at a second end 18.

Motor assembly 10 also includes a stator 20 and a rotor 22. Rotor 22 includes a rotor core (not shown) and a rotor shaft 24 extending through the rotor core. Stator 20 is mounted in frame 12 and includes a bore (not shown) extending therethrough. Rotor 22 is rotatably mounted in frame 12 with the rotor core extending through the stator bore and rotor shaft 24 rotatably supported by a bearing assembly 26. Bearing assembly 26 is supported by first bearing support bracket assembly 14.

Figure 2 illustrates an exemplary frame 30, such as for dynamoelectric machine 10 (shown in Figure 1), with which the invention may be practiced. A bearing support bracket assembly 32 is mounted, coupled, or otherwise attached to frame 30 and supports a bearing assembly 34. Bearing assembly 34 includes a bore

36 which receives, and allows rotation of, a rotor shaft, such as rotor shaft 24 (shown in Figure 1). It is contemplated that the present invention may be practiced with a variety of bearing assemblies similar or dissimilar to bearing assembly 34. Therefore, bearing assembly 34 is illustrated for exemplary purposes only and is not intended to limit the invention to any particular type of bearing assembly. It is further contemplated that other frames may be used to receive bearing support bracket assembly 30 within the scope of the present invention.

Figure 3 illustrates bracket assembly 32 including a base plate 40 having a bearing mounting surface 42. Bracket assembly 32 also includes a bracket support assembly 44 including a support member 46, a first end plate 48 and a second end plate 50. Support member 46 is a semi-annular ring extending between first end plate 48 and second end plate 50. In an alternative embodiment, support member 46 is fabricated from a plurality of members to form a curved section that extends between first end plate 48 and second end plate 50. End plates 48 and 50 extend substantially perpendicularly from a base plate outer surface 52. In one embodiment, plates 48 and 50 are substantially flat and contact support member 46.

In one embodiment, a first support plate 54 extends from first end plate 48 and support member 46 and is spaced a distance (not shown) from base plate 40. A first intermediate end plate 56 and a first side plate 58 extend from base plate 40 to first support plate 54. A first enclosure 60 is formed by base plate 40, first support plate 54, first end plate 48, first intermediate end plate 56 and first side plate 58. First enclosure 60 has a hollow space therein. A second support plate 62 extends from second end plate 50 and support member 46 and is spaced a distance (not shown) from base plate 40. A second intermediate end plate 64 and a second side plate 66 extend from base plate 40 to second support plate 62. A second enclosure 68 is formed by base plate 40, second support plate 62, second end plate 50, second intermediate end plate 64 and second side plate 66. Second enclosure 68 has a hollow space therein. Support member 46 defines an inner edge of first support plate 54 and second support plate 62.

First support plate 54 and second support plate 62 are separated by a base plate intermediate region or arc segment 70. Enclosures 60 and 68 reinforce bracket assembly 32 and provide a configuration effectively achieving the desired natural frequency which is unlikely to be excited in use. In one embodiment, first and second intermediate end plates 56 and 64 are substantially flat and extend

substantially radially from support member 46. In addition, first side plate 58 and second side plate 66 are substantially flat. In alternative embodiments, plates 48, 50, 56, 58, 64 and 66 are not substantially flat.

A base plate intermediate region 70 is substantially centered, or positioned equidistant from first end plate 48 and second end plate 50. In one embodiment, support plates 54 and 62 and base plate 40 are substantially planar and base plate 40 is substantially parallel to support plates 54 and 62. In an alternative embodiment, a third support plate extends across base plate intermediate region 70 and forms a third enclosure. In a further alternative embodiment, a single support plate extends from first end plate 48 to second end plate 50. In still further alternative embodiments, any number of support plates can be utilized to extend wholly or partially between first end plate 48 and second end plate 50.

The stiffness of bracket assembly 32 is altered by altering the size of enclosures 60 and 68. Bracket assembly 32 is stiffened by positioning support plates 54 and 62 further from base plate 40. In addition, the stiffness of bracket assembly 32 is altered by altering the thickness of plates 40, 48, 50, 54, 56, 58, 62, 64 and 66 and support member 46.

Bracket assembly 32 is fabricated by connecting support member 46, end plate 48, intermediate end plate 56, and side plate 58 to base plate 40 and support plate 54 by welding. Similarly, support member 46, end plate 50, intermediate end plate 64, and side plate 66 are connected to base plate 40 and support plate 62 by welding. Alternatively, the connections are other than by welding.

In an alternative embodiment, bracket assembly 32 is fabricated by casting a single plate having a substantially flat portion and an incorporated stiffening portion. The plate is thinner at the bottom and becomes thicker towards the top. In one embodiment, the transition between the flat portion and the stiffening portion is gradual. In an alternative embodiment, the transition between the flat portion and the stiffening portion is substantially immediate.

While one exemplary embodiment has been described, it is contemplated that other shapes of bracket support assembly 44 and relative positioning of base intermediate region 70 are used in alternative embodiments while achieving the benefits of the present invention.

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In practice, bracket assembly 32 is subject to static and dynamic stresses from supporting a dynamoelectric machine rotor structure and associated components coupled to the machine. A varying degree of vibration is experienced by bracket assembly 32 due to varying loads and operating conditions. Bracket support assembly 44 adds stiffness to bracket assembly 32 and reinforces bracket assembly 32. Because of the reinforcement, bracket assembly 32 provides a configuration effectively achieving the desired natural frequency which is unlikely to be excited in use.

While the invention has been described in terms of various specific embodiments, those skilled in the art will recognize that the invention can be practiced with modification within the spirit and scope of the claims.